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MANUAL FOR TEACHERS

TO ACCOMPANY

PRANG'S AIDS FOR OBJECT-TEACHING.

TRADES AND OCCUPATIONS.

By N. A. CALKINS,

AUTHOR OF "PRIMARY OBJECT-LESSONS," ETC.

CHILD NATURE.
Desire to see, TO DO, and *to tell.*

TEACHER'S WORK.
Training how to see, TO DO, and *to tell.*

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PRINCIPLES OF EDUCATION;

AND

DESIGN OF PRANG'S AIDS FOR OBJECT-TEACHING.

Nature furnishes the objects and phenomena which act upon the mind of the child, and which, in turn, the mind acts upon through the senses of the learner, causing development of mind-power, acquisition of ideas, and natural education, as the result. The personal experiences of the child, in his contact with the objects and phenomena that surround him, develop his powers, and produce that intellectual growth which leads to real knowledge.

The work of educating the child is well begun by Nature. It should be the aim of every teacher to continue the processes of education on the same lines, and with equal adaptation to the learner.

In order that teachers may more clearly understand the methods of true education, their attention is here invited to a careful consideration of important principles upon which the science and art of education are based.

The true educator selects suitable materials for the

proper exercise of the child's powers, and then stimulates the pupil's mind to work upon them.

The teacher adjusts the conditions for education between the matter, or subject, and the learner's mind.

The learner teaches himself by the exercise of the several powers of his mind upon the materials and subjects arranged for this purpose.

What the child does himself, educates him. He gains his most valuable knowledge by his own experiences. Therefore the teacher's proper work is to guide the observations of the learner so that his experiences, and the ideas gained thereby, shall lead to proper association and systematic grouping of the results of the pupil's experiences.

Knowledge consists in ideas and facts gained and properly classified by the learner, not in words memorized and recited. Words learned without ideas do not constitute knowledge. Intellectual as well as material food may be provided; but *each individual must himself take and digest it* before it will give nourishment, and promote growth and strength. The passive recipient cannot be a real learner.

Children may be trained to observe intelligently and with system, by properly directing their attention to the examination of familiar objects that come under their frequent notice. Owing to the conditions under which the work of teachers must be performed, the necessary preparation for training their pupils to form good habits of observation in matters pertaining to occupations must be made chiefly in the schoolroom, and without the presence of the actual materials and operations which constitute the subject of the instruction from which the knowledge is

to be obtained. The teacher needs, therefore, aids for properly directing the young learner how to take those important elementary steps ; aids that may be easily taken into the class-room, and which are especially adapted to the purpose of the instruction ; aids that will enable the teacher to illustrate the proper modes of procedure in the examinations of real objects.

Were children to be sent forth to observe the various trades and occupations, without any preparation or directions as to a proper manner of doing it, much valuable time would be wasted in general observations with no definite purpose ; beside, undue attention would often be given to unimportant matters, while the chief points and most valuable characteristics would be overlooked. Habits of noticing with care and accuracy would not be formed ; and even that which was seen would not be sufficiently understood to lead the observer to gain real knowledge.

From the foregoing statements, teachers will understand that *Prang's Pictures of Trades and Occupations* are designed to be used as materials for training children in habits of systematic examination of real objects ; that they are what their title indicates, —

"*Aids for Object-Teaching.*"

These representations are intended to be used as a means of awakening a desire to know more about trades and occupations in which people are daily engaged, and of furnishing a ready means of pointing out the various kinds of materials, tools, and acts of labor, required in carrying them on, and leading the pupils to understand the relations of these operations to the common welfare of all.

It is believed that a proper use of *Prang's Aids for Object-Teaching* will enable teachers to insure practical results in training their pupils to form good habits of gaining knowledge, and in imparting practical information concerning the important matters of daily life.

For the purpose of assisting teachers in making a proper use of these Aids, the following lessons have been prepared. It is not intended that these lessons shall be followed literally by teacher and pupils; but it is earnestly hoped, that, from a study of the methods therein given, clearer ideas may be obtained of the purpose and utility of these Aids, and that the modes by which they can be employed to facilitate the work of real education shall be well understood.

With the sincere hope that these chromo illustrations may lead to the easy attainment of the important ends herein indicated, they are commended to the careful attention of all true teachers, — those who believe that it is more useful to teach children how to obtain facts, than merely to give them facts to be remembered; that it is better to train them to study intelligently objects and Nature, than to confine them to memorizing the contents of books.

PLAN OF LESSONS,

AND

METHODS OF INSTRUCTION.

FOR

PRANG'S AIDS FOR OBJECT-TEACHING.

PLAN OF GRADED LESSONS,

AND

METHODS OF INSTRUCTION.

THE *aims* of the lessons on the *trades and occupations*, and the *order* of presenting them, may be seen in the following statements as to what should be accomplished by the exercises given in each of the *four grades of lessons*.

The divisions into grades are made for the purpose of presenting the different stages of the instruction in a definite manner; they do not indicate the number of lessons to be given in each grade, nor do they mean "grades of classes." The exercises of a grade may include one, two, three, or more lessons for each trade, as the teacher may find to be desirable. Read, therefore, what is said under this head, "Plan of Graded Lessons," for the purpose of learning the, —

Aims of the Lessons, and the order of giving them.

First Grade. — The exercises of the first grade should cause the pupils to make a careful observation of the picture before them, to ascertain what trade or occu-

pation is represented by it; to notice what work the several persons are doing, also what materials and tools they are using; and, as far as possible, to learn what articles they are making, and what those articles are for. The exercises should be accompanied with such conversation as will cause the pupils to desire to see and learn more about the given occupation.

The teacher, at the close of the lesson, may point out the most important objects represented in the picture, in order to indicate what the pupils should try to see when they visit the place where the work of the trade or occupation may be seen in its various stages of progress.

Second Grade. — Having learned, in the previous grade, those things which pertain to a trade or occupation that should be particularly noticed, the pupils are now prepared to observe real objects intelligently; and they may be requested to try to see persons engaged at the work of a given trade, and *to notice*, —

The tools and materials used;
What work is done with the tools;
What articles are made.

By such observations the pupils become prepared for subsequent lessons in the schoolroom, in connection with the pictures. These subsequent lessons should require the pupils to describe what has been observed, as above indicated; to point out in the picture, and to name, the various objects mentioned, especially those which they saw in use, and the work which they saw performed.

Third Grade. — The lessons of this grade should lead the pupils, by means of suitable questions, to consider, —

What the persons represented in the picture *work upon;*
What they work with;
Why they do the given work;
What articles are made;
What is done with that which is made.

It will readily be seen that the exercises of this grade will assume the character of a conversation between teacher and pupils, with the matter of the conversation guided by the teacher; while the answers and remarks of the pupils, and the questions and statements of the teacher, should be confined to that which pertains to the trade under discussion. Care should be had to treat the different steps of the lesson in their proper order.

Fourth Grade. — This grade may embrace a complete and connected description of the picture, names of tools used, the work done, the articles made, materials used, the uses of the articles produced. This description may be oral only, in classes of young children; but it should be required in writing, on slates or on paper, of pupils who have learned to write.

For more definite information relative to giving lessons on trades and occupations, see the following illustrative exercises under "*Methods of Instruction.*" These exercises are intended only to indicate the *manner* of conducting the lessons, and not the extent or complete matter of each.

METHODS OF INSTRUCTION

FOR EACH GRADE.

First Grade. — Place a picture representing a trade or occupation before the pupils. Then request all to look at it carefully; and, after allowing a minute or two for the class to observe it, let each one who can point out and name something in the picture raise a hand. These several pupils, in turn, may tell what they see, also point it out. For leading the pupils to do this successfully, different grades of exercises should be furnished, some of which ought to be adapted to the capacity of the youngest pupils to whom these lessons may be given.

The first exercise may consist in naming and pointing by the pupils to the tools, materials, objects, &c., seen in the picture.

In *the second exercise* the pupils may be required to state the principal use of each object named.

In *other exercises* they may mention the work done, the materials upon which the work is performed, the tools used, the articles made, the persons at work, what each is doing, what can be seen in any part of the picture, what the entire picture represents.

For illustrations of exercises in the first grade, suppose the picture of the "*kitchen*" be placed before the children. Request them to try to see something in the picture which they can name. Each pupil may then be allowed to name and point out a single object.

First Exercise. — "This is the picture of a range."
"This is the picture of a pail."
"This is the picture of a clock."
"This is the picture of a table," &c.

Second Exercise. — The pupil should point to each object named. "The range is for cooking."
"The clock is to tell the time of day."
"The teakettle is for heating water to make tea and coffee," &c.

Third Exercise. — "This woman is rolling out some dough to make pie. The dough is on a board on the table; and she is using a rolling-pin to make it thin."
"She will peel the apples, then cut them in thin slices to make the pie."
"The basket stands on the chair. It is full of eggs."
"The closet door is open, and I can see dishes and boxes in it."

Should the picture of the "*shoemaker*" be placed before the pupils, the following statements may indicate what the pupils might say in the different exercises: —

First Exercise. — "This is the picture of a shoemaker. He sits on a bench."

"Here are two rolls of leather."

"This pail stands near the shoemaker."

"This is a pair of new boots."

"Here is a hammer, a pair of pincers, and something else on the floor."

"There are two brushes under the window."

"Here is another pair of pincers."

"On the floor are pieces of leather."

"A pair of gaiters stand on the floor, at the end of the bench."

Second Exercise. — "These knives are used to cut the leather, and the straight awls to make holes in the leather for the pegs and nails."

"This shelf is used to put lasts on. Boots and shoes are made on lasts to give them the shape of the foot."

"The shoemaker uses his hammer to pound the leather, and to make holes with the awl, and to drive in pegs and nails."

"This bench has a drawer. It is partly open. The shoemaker keeps thread, pegs, nails, and tools in his drawer."

"In the back part of this picture are drawers for keeping shoes."

Third Exercise. — "This shoemaker is making a boot. He pounds the awl to make holes in the sole-leather, into which he drives pegs."

"The man in this part of the picture is trying to fit a lady with a pair of shoes. These persons are in the shoe-store."

"A shoemaker cuts leather with a knife. He hammers sole-leather on a lapstone to make it solid."

"Shoemakers sew *parts* of the shoe together. They sew the *legs* of boots."

For Review Exercises the teacher may place before the class two or three of these pictures, and then direct the attention of the pupils to objects of the same class, as tools, kinds of work, articles made, allowing them to point out, give the name, and tell the use of, or otherwise describe, that which is indicated. During these exercises the pupils should point out only objects belonging to the same class, as tools, until all the representations in both the pictures of objects of that class have been named; then, at the direction of the teacher, objects of another class, as articles made, may be pointed out in the same manner, and so on. During all of these exercises, care should be taken to require the pupils *to do* something which will show that they know that which is taught, and also to awaken in them a desire *to see* and *describe*.

In giving lessons with some of these pictures, it might be well to omit the *third series* of *exercises* until the pupils have seen the tools used, the work performed, and the articles made, which pertain to the trade represented. This omission would be best in all cases where the children had not previously seen and learned something about the subject of the lesson.

Having given a sufficient number of exercises with the picture of a trade, which number will vary with the differences in age and progress of the pupils, the teacher may tell the pupils that another lesson will be given about the *shoemaker* (or other trade, as the case may be) next week; and at the same time request them to visit a shoe-store or shoe-shop before the next lesson, and learn the names

and uses of the tools and materials used, especially of those which they see used; and also to try to learn other facts, pertaining to what the shoemaker does, which they may tell the class.

The observations which the different pupils would make in accordance with the preceding request would prepare the class for the exercises of the *Second Grade;* especially if the teacher conducted the lesson so as to cause the several facts, or items of knowledge, gathered by each individual, to become the common stock of information shared equally by all the members of the class.

Second Grade. — When the time for the Second Grade lesson arrives, the picture representing the subject of the lesson should be placed before the class, and the several pupils called upon to point out those objects represented in it which they have seen before, and at the same time to name them, and tell what they are used for. The pupil should also mention different kinds of work which are done by those working at the trade, and tell what tools they use for each kind of work thus mentioned.

These exercises should be conducted in such a manner that the pupils will become eager to see, learn, and tell as much as possible about the trade or occupation which forms the subject of the lesson.

The general character of the lessons of the *Second Grade* may be seen in the following statements which represent what the pupils might say, in the school-lesson with the picture of a *blacksmith* before them, after they had personally observed the operations of this artisan.

To commence the lesson, the teacher may say, —

"Point out, in the picture before you, some tool which

you have seen a blacksmith use, and tell us what he does with it."

Pupils. — "These are *tongs* [pointing at the several pairs, on the floor, wall, &c.]; the blacksmith holds the hot iron with them."

"This is an *anvil:* the hot iron is placed on it while it is beaten into the desired shape."

"In the left-hand corner of the shop are the *bellows:* with these air is forced into the fire to make it very hot. The person who works the bellows is called a *blower.* When he takes the *sledge-hammer*, and strikes the hot iron on the anvil, he is called a *striker.*"

"The *tub* by the side of the anvil is filled with water: the blacksmith cools the iron in it."

"The iron instrument on the side of the *bench*, back of the anvil, is a *vise.* It is used to hold firmly the piece of iron on which the blacksmith is working, so that he can make it smooth with a coarse *file*, or *rasp.* Here are two *rasps* and a *pair of pincers* on this bench, leaning against the wall."

"Here, at the right hand of the picture, is a man *shoeing a horse.*"

"The man at the anvil is making *horse-shoes.*"

"The instrument with a wheel, fastened against the post near the horse, is a *drill:* it is used to bore holes in iron."

Should the picture shown chance to represent some occupation which the pupils had never seen, as *Printing* or *Lithography*, the picture might be placed before the class, and the pupils requested to tell what they can see in it. In looking at the picture representing some of the

operations of printing which are not understood by them, the pupils might say, —

"I can see four men and a boy in this picture."

"The man on the right stands by something that looks like thin drawers."

"I can see many little boxes in front of him. He is reaching up with his right hand to take something from one of these little boxes."

"He holds something, of an oblong shape, in his left hand."

"The boy stands on a box or bench behind a machine. There are wheels and ropes near him, also something that looks like many sheets of white paper."

"The man in the centre of the picture stands by a table, and has a mallet and a stick in his hand. He is pounding the end of the stick."

"There is something on the table, that looks like a frame for holding small pieces together. Other frames stand by the side of the table."

"There is a large wheel, with a band on it, back of this man by the table."

"The man on the left, in the front of the picture, stands by a machine with wheels. He holds a piece of paper in his hands. I think he is printing."

When the pupils have thus observed and pointed out the principal objects represented in the picture, the teacher may proceed to tell what each object is, and its use; also what each person is represented as doing. Inasmuch as this picture represents various stages of the work of printing, the description given by the teacher should commence with the first operation, and proceed in the order of the work, somewhat as follows: —

"The man who stands at the right end of the picture is a *compositor*. In front of him are several *cases of type*. The cases are like shallow drawers, arranged with small compartments or boxes for holding the type. Each box contains but one kind of letter. All the a's are placed together in one box; all the b's in another box; all the c's in another, and so on. The case with small boxes holds the *capital letters;* and the one with the larger boxes, the small, or *lower-case* letters. The letters that are most used are placed in the largest boxes.

"The oblong piece of iron which the compositor holds in his left hand is a *composing-stick*. The type, or letters, that form the words to be printed, are placed in this stick, side by side. When the compositor has set his stick full, he places the type, or *matter*, on a *galley*, which he puts on a case or table near him. Two *galleys* stand at one end of the cases; and one *galley* stands by the iron frame, or *chase*, which leans against the table.

"When the compositor has set enough *matter* to make several *pages*, or a *form*, it is all placed on the *imposing-stone*, which forms the top of the table; here the *foreman* arranges the pages, or the *matter*, into a *form* for printing. To keep the type in place, an iron frame called a *chase* is placed around the form. Along the sides of the type, or form, are placed straight strips of wood; and, between these and the iron frame, *wedges* of wood are driven, to make the type fast in the chase. This work is called *locking up the form*. The man who locks up the form uses a *shooting-stick* made of hard wood. He places one end of this stick against a *wedge*, and pounds on the other end with his *mallet*, to drive the wedges in firm.

"To make the type level or even on the face of the

form, the man uses a smooth block of hard wood, which he calls a *planer*. The smooth side of the planer is placed on the face of the type, while the other side is gently pounded with the mallet.

"When the form is made ready, the face of the type is *inked* by passing over it a *roller* covered with *printing-ink*. Clean paper, that has been made damp with water, is placed upon the type, and evenly pressed down on it. The impression thus taken is called the *proof*. The *proof* is compared carefully with the *copy* used by the compositor when the types were set up. One person reads the *copy*, while another looks carefully at the proof to see if all the words are like those in the copy. If any mistakes are found in the proof, they are plainly marked by the *proof-reader* on the margin of the page. When the *reading* is finished, the proof is given to the compositor, who *unlocks* the form, by loosening the wedges, and then takes letters from his case, and corrects the mistakes which he made while setting up the copy.

"When the form has been *corrected* by the compositor, and *revised* or looked over by the *foreman*, it is sent to the *press*, where as many *copies* as are wanted are printed.

"The boy who stands back of the machinery is *feeding the press*. The pile of white paper before him has been *wet-down*, or dampened, so as to receive the ink readily. The *form* has been placed *on the press*, which is moved by steam-power. One sheet of paper is moved down at a time; this is immediately carried by the machinery over the *form*, and the types are pressed against it. Then the printed sheet is carried forward; and the type is again inked by rollers, when another sheet is moved over the form, and printed as before.

"The frame of narrow bars, —*fly*, —which may be seen back of the large wheel, turns over the printed sheets, one at a time, upon the board that may be seen below it.

"The man at the back of the picture, on the left hand, dips the white paper in a *trough*, or box, of water, and then puts it in a pile, that it may become evenly damp throughout.

"The man in front, on the left, stands by a small printing-press on which *cards*, *circulars*, *tickets*, &c., are printed.

"A *form* of type, *locked up* in a *chase*, stands between the small printing-press and the *imposing-table*. The man behind the table is *locking up* a form to *make it ready* for the press."

After the teacher has described the objects and the work represented in a picture of a trade, which cannot be seen personally by the pupils, they may be called upon singly to point out these objects, and describe their use, and the work represented, &c., as suitable exercises for subsequent lessons upon the same trade.

Older pupils may be required to describe the picture, the tools, the work, &c., in writing.

Third Grade.—In previous grades the pupils have learned the names and uses of tools and materials, what articles are made, their uses, what each kind of work is called. During the lessons of this grade, it is intended that the pupils shall be led by questions to consider matters pertaining to trades and occupations, in a way that will cause them to gain new ideas of the relations of the work done, tools used, and articles made, to the affairs of daily life. These lessons should be so conducted as to

draw from the children their own thoughts about the subject under consideration; also so as to correct their *mistaken notions* in relation thereto, and to lead them to understand that work is a means by which the necessaries and comforts of life are supplied. These lessons will increase the desire for seeking knowledge, will add to the power of gaining it, and develop the pupils' ability of self-guidance in subsequent duties of life.

The following suggestions and questions will indicate the mode of conducting the lessons in the *Third Grade*. The teacher might place the picture of "*The Carpenter*" before the class, and write on the blackboard a statement, thus: —

CARPENTERS *hew, bore, mortise, saw, plane, join, hammer, build.*

He may then proceed to ask the pupils successively questions similar to the following, and follow each question with such others as the answers given by the pupils seem to indicate as necessary in order to obtain intelligent answers to each of the several interrogations commencing with, *What? Why? When?*

What do carpenters *hew?*
Why do they *hew?*
What tools are used in hewing?
What do carpenters *bore?*
Why do they *bore?*
What *tools are used* in boring?
What do carpenters *mortise?*
Why do they *mortise?*
What *tools are used* in mortising?
What do carpenters *saw?*
Why do they *saw?*
What do carpenters *plane?*
Why do they *plane?*

What *tools are used* in planing?
What do carpenters *join?*
Why do they *join?*
What *tools are used* in joining?
What, why, and *where* do carpenters *hammer?*
What do carpenters *build?*
Why do they *build?*
When and *where* do they *build?*
What do you call the men who build with *wood?* those who build with *brick* and *stone?*
What parts of the house does the *carpenter* build?
Can you name any other classes of workmen[1] that aid in building houses? What part of the work does each class do?

Suppose the picture of the *kitchen* is placed before the class for a lesson of the *Third Grade:* the teacher might write on the blackboard the following: —

"*Food is boiled, broiled, fried, roasted, stewed, baked, seasoned, mixed, kneaded, chopped,*" &c.

Or the following: —

"*Work done in the kitchen is called boiling, broiling, stewing, roasting, basting, frying, baking, steeping, kneading, rolling, mixing, grating, chopping, beating, seasoning, washing, starching, sprinkling, ironing, scrubbing,*" &c.

The teacher may then proceed to ask questions, similar to these: —

What *food* is boiled? roasted? baked?
Why is it boiled? roasted? baked?
How is it boiled? roasted? baked?
What is *mixing? kneading? rolling?*
What is mixed? kneaded? rolled?
How is it mixed? kneaded? rolled?
Why is it mixed? kneaded? rolled?

[1] Masons, plasterers, painters, glaziers, tin-roofers, plumbers, bell-hangers, &c.

What is *frying? broiling? stewing?*
What is fried? broiled? stewed?
How is it fried? broiled? stewed?
Why is it fried? broiled? stewed?
When is broiling better than frying?
When is stewing better than roasting?
What is *steeping? basting? beating?*
What is steeped? basted? beaten?
How is it steeped? basted? beaten?
Why is it steeped? basted? beaten?
Who does this work?
What is *washing? starching? sprinkling? ironing?*
How is each done?
Why is washing done? starching? sprinkling? ironing? fluting?
What is *seasoning? grating? chopping?*
Why is food seasoned? grated? chopped?
What is *sweeping? scrubbing? mopping?*
How is it done?
Why is it done?
What is *dough? yeast? sponge?*
How is dough made? yeast? sponge?
What is meant by "*setting the sponge*"?
What is *batter? sauce? pudding?*
How is it made?
Why is it made?

The teacher might write on the blackboard the names of utensils used in the kitchen, and question the pupils concerning them somewhat as follows: —

"Range, scuttle, kettle, saucepan, spider, dipper, pail, spoons, rolling-pin, sink, boiler, table, coffee-pot, canister, dustpan, brush, pitcher," &c.

When is a range used? scuttle? kettle, &c.?
Why is a range used? scuttle? kettle? pail, &c.?

Fourth Grade. — The description of the trade or occupation, which is given by the pupils of the fourth grade, may be made more or less complete, according to their age, and progress in observation and description.

They should be encouraged to make their descriptions original, by each one telling what he or she has seen and learned about the given occupation.

In no case should the teacher prepare a description to be learned and recited by the pupils; nor should the outline statements given in this "Manual," as matters of information for the teacher, *be furnished the pupils to be memorized.* Such a course would defeat the great aim of these lessons, viz., the individual training of each pupil in habits of accurate *observation* and *description.* Since the object of using these illustrations of trades is to teach children how to see and describe intelligently, and since this end can be attained only by actual exercise of their own powers of seeing and telling, these lessons should be so conducted throughout each and all of the grades as *to require the pupils to make the observations, and give original descriptions.*

The following descriptive lessons of the *tailor* and of the *tinsmith* will serve to illustrate exercises appropriate for the Fourth Grade, or the advanced lessons: —

"This picture represents two rooms of a *merchant-tailor,* — the *store* and the *workroom.* In the back part of the picture may be seen the store, where the *tailor* is taking a man's *measure* for a new coat. On the *counter*, back of these two men, are *pieces of cloth.* On the *shelves* beyond, are boxes of *buttons* and other *trimmings* for *coats*, *vests*, and *pantaloons.*

"The front portion of the picture represents the *shop*, or workroom. At the left side of this room may be seen the *cutter*, with a *pair of shears*, *a square*, *a stick*, *a tape-measure*, and a piece of cloth, on the table, or *counter.* With a piece of *chalk*, or *talc*, he has marked lines on the cloth, to show where to cut out the *garment.*

"At the right end of the picture is a low table, or *tailor's board*, on which two tailors sit and *sew*. One of these men is *sewing*, the other is *threading his needle*. In front of this table is a woman using a *sewing-machine*. At the left of this woman is a young man *pressing the seams* of a garment with a *goose*. Before pressing, he makes the seams damp with a sponge dipped in water. Back of him, in the centre of the room, is a *stove* for *heating* the *goose*. On the right side of the stove is a *cover* to put on the stove over the *irons*, while heating them. On the left side of the stove stands a *coal-scuttle*, filled with coal. Back of the tailors hang some of the finished garments, — a coat, vests, and pantaloons.

"Besides the articles already mentioned, tailors also use thimbles, scissors, needles, press-board, holder, sponge, beeswax, thread, silk, twist, buttons, patterns, &c.

"Formerly all sewing was done by hand. Now sewing-machines are chiefly used for this purpose. By this means much time and expense are saved in making clothing."

"This picture represents *tinsmiths* at work in a *shop*, also a *stove-store*, where stoves and *tinware* are sold.

"Along one side of the *shop* is a *work-bench* with the tools used in working with *tin* and *sheet-iron*. At one end of the work-bench is a *vise*. At the corner, near the vise, a *pair of shears*, used for cutting *tin* and *sheet-iron*, lean against the bench.

"On the bench stands a small, stove-like *furnace*, for heating the *soldering-iron*. The man holds a small tin pipe in his left hand, and a hot soldering-iron in his right hand. He is *soldering* the edges of the tin together. In front of this workman are small shears, pincers, also

irons on which the tin is placed to bend it into the desired shape.

"The other workman has made some *joints of stove-pipe*, and now is making a square pan of sheet-iron. His hammer has a curved face on each end. The machine at his right hand is for bending the edges of the pan so as to make them stiff and smooth. To make the edges of tin pans and tin pails stronger, a wire is put around under the bent edges.

"On the floor, back of these workmen, are several things which they have made of tin and sheet-iron. Among them may be seen a tin pan, a wash-boiler, a dipper, a watering-pot, two sheet-iron pans, and stove-pipe.

"In the back part of the right end of the picture, may be seen the *salesroom*, with stoves, tinware, bird-cages, lanterns, &c. A man is showing a cooking-stove to a lady. Parlor-stoves may be seen back of the lady.

"*Tin* is a whitish metal, somewhat resembling silver. It is harder than lead, and softer than silver. It is obtained from *tin-ore*, which is found in the earth. Most of the tin used is procured from the tin-mines in England. That which is commonly called *tin*, from which tin cups, pails, and pans are made, is manufactured from very thin sheet-iron, by dipping the sheets in melted tin three or four times. Tinware will not rust while the iron is covered with a coat of tin."

Other successful modes of using these pictures for giving instruction relative to trades and occupations may be devised by skilful teachers, which will prove interesting and practical. That which is chiefly important, in

giving these lessons, is to provide exercises which shall cause the pupils to see for themselves, and to learn the important facts relative to those trades by their own observation and experience, under a proper guidance of the teacher.

Whenever the pupils are able to represent, even by the most simple drawings, the tools and other objects which they see while examining the operations of any trade, and will make such illustrations to accompany their descriptions in the exercises of the Fourth Grade, it will materially increase the value of these lessons.

USEFUL INFORMATION

PERTAINING TO THE

TRADES AND OCCUPATIONS

REPRESENTED IN

PRANG'S AIDS FOR OBJECT TEACHING.

FOR TEACHERS.

INFORMATION RELATIVE TO TRADES AND OCCUPATIONS.

THE information given in the following pages, relative to *Trades and Occupations*, is intended to save teachers the time that would be spent, and the trouble that might be experienced, were each one left to make personal investigations, to gather the facts needed at the commencement of these lessons, in order to conduct them so as to make the exercises interesting and practical. It is not designed, however, to supply all the information that might be useful in giving the lessons, but to furnish such matter as will serve to guide the teacher at the outset, and also to add other facts not easily obtained.

In previous pages directions have been given for conducting lessons on Trades and Occupations; but the methods should not be limited to those there described. Other profitable exercises could be introduced, especially for the *Second Grade* of lessons, by writing on the blackboard the *names* only of the tools, and other objects represented in the picture of a trade, and requiring the pupils to point them out in that picture. For other exercises, write on the blackboard the names of the different kinds

of work performed, and proceed in a manner similar to that with the tools.

To require the pupils to spell the principal words relating to a trade will make a valuable exercise; because it intimately associates the form of the word with the objects represented.

The success of teachers, in giving these lessons so as to produce the best results in education, depends so much upon the *manner of conducting the lessons*, that it seems desirable to reiterate the importance of careful attention to this matter, and to entreat teachers to remember that the aims of these lessons cannot be attained by communicating to the pupils the information relative to the trades as so many facts to be learned by them. Valuable as this information might prove to be to many pupils, the discipline of their powers of observation, and the important habits which may be formed by conducting the lessons as they are designed to be given, will be tenfold more valuable to them.

Aim to present each lesson so as to train the pupils *how to see, to do, and to tell*, that which you awaken in them *a desire to see, to do, and to tell.*

The statements made here of the materials and tools used, of the kinds of work performed, and the articles made by a given trade, will not be limited to the objects represented in the respective pictures. It is believed, however, that all the facts given herein will be found useful in some of the grades of the instruction.

CARPENTER.

The principal designs of this picture are to represent different kinds of labor performed, and materials and tools used, by the common carpenter in building frame-houses.

The materials used for building frame houses and barns are, — timber for beams, sills, posts, plates, rafters, girders, joists, braces, studs, scaffold, plank, boards, siding or clapboards, shingles, lath, &c.

Tools used for cutting: axe, adze, saw, chisels, gouges, shaving-knife, broad-axe, hatchet, spoke-shave.

Tools used for boring: augers, gimlets, bits and brace, brad-awl.

Tools used for pounding and splitting: hammer, mallet, beetle, sledge-hammer, wedge, crowbar.

Tools used for measuring and marking: rule, square, bevel, scratch-awl, gauge, compasses, chalk-line, level, plumb-line.

Tools used for smoothing: planes, scraper, rasp, file, sand-paper.

Tools used for holding: vise, pincers, pliers, wedges, bolts, screws, bench-hooks, clamps.

Kinds of work: hewing, sawing, splitting, mortising, tenoning, boring, notching, pinning, planing, wedging, grooving, matching, bevelling, mitering, joining, scarfing, dove-tailing, furring, bracketing, sheathing, siding, shingling, framing, scribing.

Parts of a frame-building: sills, posts, beams, braces, girders, studs, plates, rafters, tri-beams, brackets, joists, door-frame, window-frame, scaffold, foundation, &c.

Parts of a finished building: sides, ends, walls, partitions, roof, eaves, doors, windows, shutters, door-sill, window-sill, balcony, floors, steps, stairs, railing, ceiling, cornice, frieze, moulding, panel, column, base, cap.

Rooms of a house: cellar, kitchen, pantry, store-room, laundry, dining-room, reception-room, sitting-room, parlor, library, hall, vestibule, closets, bedroom, bath-room, chamber, attic, garret, woodhouse, &c.

Parts of a barn: floor, stable, granary, bay, loft, doors, stalls, bins.

The work represented in the picture of the *Carpenter* is: boring, mortising, sawing, siding, nailing, clapboarding, shingling, roofing, &c.

The tools and materials represented are: a *broad-axe*, for hewing; an *auger-machine*, for boring; a *chisel* and *mallet*, for mortising; *saws*, for sawing; a bench or *saw-horse*, for holding the boards while sawing them; a *hammer*, for driving nails; a *scaffold*, to stand upon while at work on the higher parts of the building; *shingles*, for the roof; and *lumber*, of various kinds and dimensions, for *posts*, *sills*, *beams*, *plates*, *braces*, *joists*, *studs*, *rafters*, &c., all of which are parts of the *frame* of a house. In the unfinished houses represented in the picture, there may also be seen the *frames* and *casings* for the doors and windows, the *rough boards* which are nailed to the *studding*, and the *clapboards* with which wooden houses are finished on the outside.

What do carpenters produce?
How do they procure food?
How do they obtain clothing?

What is meant by hewing? mortising? scarfing? mitering? matching? bevelling? sheathing? lathing? framing? furring? dove-tailing? scribing, &c.?

The foregoing and similar questions may be asked to induce the pupils to seek information from carpenters, or elsewhere, relative to the various operations of this trade. Of course teachers should use judgment in this matter, and not require the pupils to give minute details in their answers.

Teachers should not prepare the answers to the questions, and teach them to their pupils. The chief value of these lessons consists in that which it causes pupils to learn for themselves.

SHOEMAKER.

The design of this picture is to represent the trade of the Shoemaker. It shows the interior of his shop, and of the sales-room, or shoe-store.

Materials used by the Shoemaker: various kinds of leather, as sole-leather, upper-leather, calf-skin, goat-skin, morocco, patent-leather, kip-skin, cow-hide, sheep-skin, lining, pegs, nails, tacks, shoe-thread, hog's-bristles, wax, paste, tallow, sand-paper, blacking, eyelets, whet-stone, soapstone.

Tools used: Shoe-knives, for cutting leather; straight, or *pegging-awls*, for punching holes for pegs and nails; curved, or *sewing awls*, for punching holes for the waxed shoe-thread when sewing; *lasting-awl*, a sewing awl with an eye near the point for carrying a thread through the leather as the hole is made; *last*, a foot-shaped block of wood placed inside of a shoe or boot to give the desired size and shape to the foot of the shoe or boot; *lasting-pincers*, a tool used for stretching the leather tightly around the last, &c.; *tack*, a kind of nail for holding the leather in place while pegging or sewing it; *shoe-hammer*,

a kind of hammer for pounding sole-leather to make it solid, also for driving in the pegging-awl, and pegs and nails; *lap-stone*, a flat, smooth stone or iron on which the leather is placed while hammering it; *sewing-clamp*, is used to hold pieces of leather together while sewing or stitching them; *strap*, used to hold the shoe or boot firmly on the knee while making it; *float*, a tool having a serrated, or rasp-like face, and a long handle, used for cutting off the ends of pegs inside the shoe or boot; *boot-tree*, used to give a proper shape to the leg and instep of the boot after the last is removed; *crimp*, or *crimping-machine*, an instrument made of hard-wood board, on which the upper leather for a boot is stretched to give it shape at the ankle and instep.

Kinds of work done by the shoemaker: measuring, cutting, crimping, soaking, sewing, pasting, welting, stitching, fitting, lasting, pegging, nailing, treeing, trimming, polishing, blacking, scraping, footing, tapping, capping, half-soling, foxing, mending.

Parts of a Shoe: uppers (vamp and quarters), soles, shank, heel, lifts of the heel, toe, ball of the sole, insole, tongue, lining, shoe-string, stitching, pegging.

Parts of a Boot: leg, front or vamp, straps, counter, welt, side-seam, lining, stitching, shank, instep, insole, heel, toe, lifts of heel.

Kinds of leather, from what made: *Calf-skin*, from the skin of calves not more than five or six months old; *kip-leather*, from the skins of young cattle older than calves;

sole-leather, from the thick parts of the skin of the ox and the cow; *cow-hide*, is a thick leather for coarse boots and shoes, made from thin skins of young cows; genuine *morocco* is made from the skins of goats; the skins of kids, killed when too young to eat grass, are tanned or dressed, for *kid*-gloves; *sheepskin* is sometimes dressed to imitate morocco, but it makes a soft, spongy, and weak leather; *patent-leather*, a fine leather covered with a kind of japan, which gives it a permanent polish.

Kinds of shoes, boots, &c.: Heavy boots; patent-leather boots; Congress boots; laced boots; gaiters; Oxford-ties; shoes; slippers, &c.

Shoemakers cut, fit, sew, stitch, last, peg, welt, tap, foot, mend, &c.

What do shoemakers cut? sew? peg, &c.?
Why do they stitch? peg? last? welt?
What tools are used to cut? sew? peg? last? stitch? &c.
When do shoemakers *sew*, and when do they *peg?* *When* do they *mend*, and when do they *make?*
Where are *welts* used? Why?
When, *where*, and *why*, are nails used?
Why does the shoemaker use *wax?*
Why does he *hammer* the leather?
What do shoemakers produce?
How do they procure food and clothing?
Where do they get leather?
How is leather made?
Point out and name the parts of a shoe; of a boot.
What kind of shoe, or boot, do you wear?
What kinds of leather are your shoes made of?
Are your shoes pegged, or sewed?
Why are nails put in the heels?

TAILOR.

This picture of the *tailor* is intended to represent the "merchant tailor" in his *store*, and the kinds of work performed in his *shop*.

For a description of this picture see pp. 25, 26.

Materials used by tailors: cloth of different kinds, as beaver, cassimere, doeskin, broadcloth, satinet, melton, tweed, flannel, velvet, corduroy, duck, marseilles, satin, silk, serge, silesia, hair-cloth, wadding, padding, canvas; thread, silk, twist, buttons, braid, cord, wax, chalk, emery, &c.

Tools used by tailors: tape-measure, yard-stick, square, shears, scissors, needles, thimble, sewing-machine, press-board, goose, holder, sponge, patterns.

Kinds of work done by tailors: measuring, marking, cutting, sponging, basting, sewing, stitching, working button-holes, binding, cording, pressing.

Garments made: coats, vests, waistcoats, pantaloons, trousers, breeches, overcoats, sacks, jackets, cloaks, frock-coats, surtouts, dress-coats, &c.

Tailors measure, cut, sponge, baste, sew, stitch, bind, press.

Kinds of Stitch. — When sewing on different parts of garments, the tailor makes his stitches in different forms, as back-stitch, side-stitch, cross-stitch, basting-stitch, herring-stitch, button-hole stitch, overcasting, &c.

What do tailors measure? cut? sponge? baste? sew? stitch? press?

Why do they measure? sponge? press, &c.?

How do they measure? cut? sponge?

When do they baste? bind?

Tailors produce or make clothing: how do they obtain food?

Who makes the cloth which tailors use?

BLACKSMITH.

This picture is designed to represent the interior of a blacksmith's shop, and to show the different stages of horse-shoeing.

Materials used by the blacksmith: iron and steel in the form of bars, rods, &c.; charcoal, bituminous coal, anthracite coal, coke, sand, borax, salt, water.

Tools used: bellows, anvil, tongs, hammers, sledge-hammers, chisels, swage, punches, rasp, file, vise, pincers, drill, roller, bench, box, knife, butteris, clincher.

Kinds of work done: blowing, striking, forging, beating, welding, swaging or cutting, punching, drilling, rolling, filing, tempering, annealing, shoeing, setting tires, ironing wagons, &c.

Articles made: horse-shoes, nails, braces, bolts, nuts, screws, tires, hoes, shovels, hammers, hooks, chains, and other tools and utensils which are made of iron or steel.

A forge is the furnace and shop where the blacksmith

works. It has a small, open fireplace, or hearth, about three feet above the floor.

The fuel used may consist of *charcoal*, *coke*, *bituminous coal*, or *anthracite coal*.

The bellows is an instrument for forcing air into the fire to make it very hot. The bellows is made of two similar plates of wood or wide board, tapering toward one end. These are connected at the edges by sheets of leather so as to form a chamber for air. As these two boards are made to approach each other, the leather at the sides folds; and the air is forced out through a tube or pipe fixed in the small end, and leading to the fire. The bellows is usually worked with one hand by pulling down the arm of the lever, while the smith attends to the fire and the heated iron with the other.

Sometimes the smith dips a broom into the trough of water which usually stands by the side of the hearth, and sprinkles the fire, to check the combustion of the coal on the surface.

The anvil is an iron block, with a smooth, hard face on the top. This is usually placed on the end of a block of wood, which is fastened to the floor or to the ground. At one end of the anvil is a *horn*, or cone-shaped arm. Near one edge is a square hole, in which are set chisel-shaped tools for cutting the hot iron.

The smith holds the hot iron on the anvil, with a pair of tongs in his left hand, while he pounds it with a hammer held in his right hand. If the iron needs much pounding, an assistant, who is usually the one that works the bellows, takes a *sledge-hammer*, and strikes the iron alternately with the smith, who moves and turns it on the anvil so that the blows may give it the desired shape.

When the smith desires the *striker* to commence using the sledge-hammer, or to stop striking, he taps the anvil with his hammer. The striker understands the signal, and acts accordingly.

The person who *blows* and *strikes* is frequently called the "*blower and striker*," because he does both kinds of work.

Punches are used for making holes through the iron when it is softened by heat.

Chisels (wedge-like in shape) are used for cutting the iron;

Tongs, for holding, turning, and carrying the hot iron;

Vise, for holding the iron firmly while shaping or filing it.

Rasp, a coarse file for finishing articles made of iron.

Bench, the table-like shelf at one side of the shop, where the blacksmith keeps his small tools, and on which the iron *vise* is fastened.

Drill, an instrument for boring or drilling holes in hard or cold iron.

Roller, a machine used for the purpose of bending iron for tires, &c.

Shoeing a horse: nailing an iron shoe on the hoof of the horse, to prevent the hoof from wearing away or splitting. See pp. 16, 17.

Blacksmiths heat, forge, weld, blow, strike, temper.

What do they heat? forge? weld?
Why do they heat? forge? weld?
What does the blacksmith produce?
How does he procure food and clothing?

LITHOGRAPHER.

[The information concerning lithography is inserted at this place, because the picture representing a lithographer at work follows the *blacksmith* in the order of the numbers inadvertently given to the pictures. It will be better, however, to defer the lessons on lithography until the pupils have become familiar with *the printer*. The teacher will then have an opportunity for comparing the different kinds of printing. The comparison will help the pupils to a better understanding of this subject.]

All printing which is done on printing-presses may be classed under three heads, viz., —

First. Printing from lines *raised above* the surface.

Second. Printing from lines *sunk below* the surface.

Third. Printing from perfectly *flat* surfaces.

Any ordinary book, newspaper, or impression from a wood-cut may be used to illustrate the first kind of printing. Any steel-plate or copper-plate engraving (as a bank-bill) furnishes an example of the second kind of printing. The plates representing these "Trades and Occupations" are specimens of the third kind of printing, or of *lithographic* printing.

It is easy to understand the method of the first kind. The lines, or faces, of the types being raised above the surface, they alone can receive ink as the roller passes over them. When the paper is pressed down upon the raised lines, or types, after they have been inked, the ink adheres to the paper, and thus makes the impression which is called print, as seen in books, newspapers, &c.

In copper-plate or steel-plate printing, the ink is worked or pressed into the incised lines; the smooth surface is then cleaned, care being taken not to wipe the ink out of the lines. The sheet of paper, which is then laid on the metal plate, is pressed into the lines where it comes in contact with the ink, which adheres to the paper, and thus produces an impression on the paper.

In *lithography*, however, the printing is done from a perfectly smooth surface. It is evident, therefore, that this kind of printing cannot be a purely *mechanical* process, as with the other two kinds. It is in fact, to some extent, a *chemical* process.

Lithography literally means *stone-writing*. All lithographs are made on stones of a particular kind, the main constituent of which is a carbonate of lime. This stone is obtained chiefly from quarries in Bavaria, Europe. In our country it is sold by the pound; and the price increases rapidly with the size of the stone, varying from *five* to *twenty-five* cents per pound.

The first operation to be performed is the *grinding* of the stone, so as to give it an even surface. This is done by rubbing two stones against each other, with fine sand and water between them. The man at the left of the picture is represented as grinding stones. He is called a *stone-grinder*. The table or bench on which he works is

called a *grinding-trough*. It has a receptacle for the water used. The pail placed below this trough is for the purpose of receiving the water when it is drawn off.

When the stone is properly *ground*, it is given to the *lithographic draughtsman*, who makes a drawing, or design, on it, and who is seen sitting at one of the windows in the picture. The draughtsman has before him the *original* of the design, which he is to reproduce on the stone. In making his copy, the designer must *reverse* the original; i.e., what is at the right in the picture must be at the left on the stone, and *vice versa:* otherwise the printed picture would be reversed.

The *lithographic artist* executes his drawings on the stone with *lithographic crayons* or *lithographic ink*. Both of these materials contain *fat*, *lampblack*, *wax*, and *soap*. When this crayon or ink is used, the *fat* is absorbed by the stone. And when the drawing is finished, the stone is passed through several chemical processes, for the purpose of *fixing the fat in it*. The principal of these processes is called *etching*. Toward the right of the picture the stone is seen lying on the *etching-trough*. Near it stands a pot containing a solution of nitric acid in water, which is used for etching. On the pot lies the *etching-brush*, which is used for spreading the acid over the stone.

After the stone has been properly prepared for printing, parts of its flat surface differ from the other parts in their nature, namely: that part of the stone which shows the drawing, and contains the fat (now fixed in it by means of the etching process), and that part which shows no drawing, and contains no fat. These two parts act differently towards water; and *in this lies the possibility of printing from a flat stone*. If the prepared stone is wet

with water, the water will stand evenly on that part of the stone which contains no drawing; while the drawing itself, being fatty, will shed the water. Now, if this wet stone is *rolled up with ink*, the ink will adhere to the drawing, while the wet part of the stone will refuse to take it. The stone is now ready for printing.

In this picture, two kinds of *lithographic presses* are represented. The press in the middle-ground is a *lithographic hand-press;* while that in the back-ground is a *lithographic power-press*, or *steam-press*. The printer at the hand-press is represented in the act of "*rolling up*" his stone. Every time before he rolls up the stone, he goes over it with a wet sponge before he inks it.

At the left of the printer is seen the *color-slab*, — a piece of marble or other stone on which the printer spreads the ink with which to ink the stone. The bottles, cups, &c., on and under the table contain turpentine, acids, water, &c., which are needed to clean and wash the stone. At the left of the printer, on the press, is the paper on which the impressions are to be printed. Lithographic presses are different from ordinary printing-presses. The stone moves on a *bed*, which runs on *rollers* turned by a *crank*. The stone on the bed, after a sheet of paper has been placed on it, passes under the *scraper*, — a thin, sharp piece of hard wood, — which presses the paper down upon the stone, and thus produces the impression. The scraper is secured in an iron frame, which can be moved up and down by means of the screw shown in the picture of the press; and thus it can be adjusted to the varying thickness of the stone used.

A stone from which a sufficient number of impressions has been taken can be *ground off;* that is to say, the

drawing upon it can be ground away, and the stone can then be used again, like a new stone. The stone which is leaning against the etching-trough in the picture is placed there because it is destined to be ground off.

Lithography comprises all kinds of writing or drawing on, and printing from stone. *Chromo-lithography* means *color stone-writing;* and the word is therefore restricted to the designation of lithographs executed in color. To do this, the various colors must be printed from separate stones. In the production of fine chromo-lithographs, or *chromos* as they are called by an abbreviation, forty and even more impressions are sometimes necessary for a single picture.

The artist in our illustration is represented as being at work upon a chromo. Before him, immediately above the stone on which he is making his drawing, is placed the original. Above the original is hung up a copy of the unfinished chromo. This unfinished impression the artist must also have before him, to guide him in the further prosecution of his task.

Materials and tools used. — Lithographic stone, lithographic crayon, lithographic pen, lithographic ink, lithographic inking-roller, paper, varnish, etching-brush, etching-trough, sponge, acid, wax, fat, lampblack, soap, turpentine, water, color-slab, sand, grinding-trough, &c. The principal parts of the lithographic hand-press are the bed, the rollers, the crank, the scraper.

When is each used? Why is it used? What is the person called who grinds the stones, who makes the lithographic drawings, who works at the press?

THE KITCHEN.

This picture is intended to represent a modern kitchen, with utensils for cooking, &c.

Materials and Utensils used. — *For fuel:* wood, charcoal, coke, soft or bituminous coal, hard or anthracite coal. *For food:* beef, veal, pork, ham, lamb, mutton, tongue, tripe, sausage, liver, venison, turkey, chicken, fish, eggs, potatoes, peas, beans, carrots, turnips, onion, squash, pumpkin, cabbage, cauliflower, spinach, tomatoes, asparagus, egg-plant, corn, flour, meal, &c.

Utensils: shovel, tongs, poker, grate, stove, griddle, oven, range, boiler, pot, tea-kettle, teapot, saucepan, spider, gridiron, ladle, pail, coal-scuttle, dipper, bucket, pan, bowl, broiler, coffee-mill, cup, mug, plate, broom, bellows, &c.

Work done. — Kindling fire, boiling, broiling, stewing, frying, roasting, toasting, steaming, baking, pickling, preserving, canning, paring, peeling, sweeping, scrubbing, scouring, mopping, &c.

Other objects seen in kitchen: clock, hot-water-boiler,

faucet, range-lids, lid-lifter, dustpan, brush, knife, fork-tray, table, chair, bench, basket, apples, rolling-pin, cup, board, towel, &c.

Require the pupils to tell as much as possible about the work done in the kitchen, the materials and utensils used.

See pp. 13, 23, 24.

GARDENING.

This picture is intended to represent a flower and fruit garden.

Objects represented: wheelbarrow, spade, rake, watering-pot, a line; a man cutting the edge of the grass-plat; one man is planting flowers; another is cutting the grass with a lawn-mower; one is hoeing among the flowers; the man on the ladder is picking fruit; in the tub stands an orange-tree; in the back part of the picture on the right is a greenhouse.

Tools used in gardening: spade, shovel, hoe, rake, trowel, weeder, wheelbarrow, ladder, roller, sickle, lawn-mower, shears, knife, sieve, watering-pot, syringe, pincers, roller.

Parts of a garden: walks, grass-plat, beds, borders, hedges, trellis, arbor, greenhouse, fountain.

Work performed in a garden: spading, ploughing, grading, raking, planting, sowing, weeding, watering, rolling, training vines, &c.

Vegetable gardens contain: beets, carrots, radishes, turnips, cabbage, cauliflower, beans, peas, cucumbers, melons, squashes, tomatoes, potatoes, parsnip, corn, asparagus, lettuce, onions, &c.

Fruit gardens and orchards contain: apples, peaches, pears, plums, quinces, apricots, strawberries, raspberries, blackberries, gooseberries, currants, grape-vines, &c.

Nursery: the place where young trees are raised.

Orchard: the place where fruit-trees grow.

Vineyard: the place where grapes are raised.

Hot-house or greenhouse: the place where plants, flowers, &c., are kept in winter, or are started in the spring, before the season for making the garden.

THE FARM-YARD.

This picture is intended to represent a farm-yard, with a barn for stabling horses and cows. In the front of the barn the farmer is feeding his poultry, which consists of turkeys, hens, chickens, ducks, and doves. By the side of the barn, on the right, is a pen for hogs. At the other side of the barn, on the left, is a field, or pasture, for the cows.

A horse and two cows may be seen in the barn. A load of hay has been drawn into the barn, and a man is pitching it into the hayloft. The farmer's watch-dog lies in the door of the barn, and will not allow the hens, ducks, or turkeys to go into the barn. In the distance, on the left, may be seen a church. The vane above the cupola on the barn is so made that it will keep the head of the horse toward the wind, and thus show which way the wind blows.

What is the shape of this vane?
You may count the ducks, and tell me how many there are.
How many hens are there in this yard?
How many turkeys?
How many doves can you see?
Can you tell how many cows are represented in this picture, and point them out?

How many hogs are there in the pen?
How many persons can you see in this picture?
You may tell what each person is doing.
Where are cows kept in summer?
Where are cows and horses kept in winter?
What do cows eat in summer?
What do cows and horses eat in winter?
Why is hay put in the barn in summer?

HAYMAKING.

You may tell what you have seen in a farm-yard, also what you have seen in a barn.

This picture is intended to represent the tools used and the work of haymaking.

Near the right-hand side of the picture is a *mower*, — a machine for cutting grass, which is drawn by horses. One of the men in the foreground has a *scythe*, with which grass is mown by hand. Grass can be cut much faster with a mowing-machine than by the scythe. As the grass is cut, it falls in rows called *swaths*. In order that the grass may dry readily, so as to make good hay, the swaths are spread over the ground.

When the grass is dry, the hay is raked into long heaps or rows called *windrows* (win'rows). The windrows are rolled up and made into piles of a conical shape, called *haycocks*, and allowed to stand a day or two in order that the hay may become thoroughly *cured*, so that it will not mould or become *musty* after it is put into the barn.

At the left-hand side of the picture is a *horse hay-rake*. This is drawn by one horse, and is used for raking hay into windrows. One of the men in the front of the picture has a hand *hay-rake* and a *pitchfork* on his shoulder.

In the back part of the picture, on the left, may be seen the operation of gathering a load of hay, to be drawn into the barn. One man pitches the hay, from the haycocks, upon the wagon. The man on the wagon places each forkful of hay in a good position for building up the load, and also drives the horses when the wagon is to be moved near other bunches of hay; and, when the load is finished, he drives to the barn where the hay is to be unloaded.

When the windrows are piled up into haycocks, also when the hay is loaded to be drawn into the barn, a man or a boy rakes up all the loose hay which is scattered. Two of the men, at work beyond the grass which has not been mown, are using rakes, and one has a pitchfork. On three of the haycocks may be seen blankets, made of cotton cloth, to protect the hay from becoming soaked and spoiled by rain before it is sufficiently cured to be drawn into the barn.

What other objects may be seen in this picture?
What is the place called where grass is cut and made into hay?
What is a *pasture?*
What is meant by *grazing?*

Implements used in haymaking: mower, scythe, pitchfork, rake, horse hay-rake, wagon, hay-rack, hay-fork, hay-loader, hay-spreader, hay-press, horse hay-fork.

Kinds of work done in making hay: mowing, spreading, turning, raking, pitching, windrowing, cocking, loading, drawing, stacking, mowing, or stowing away, unloading, &c.

Men mow, spread, rake, pitch, draw, stack, &c.

What do they mow? spread? rake? pitch, &c.?
Why do they mow? spread? rake, &c.?
When do they mow? spread? rake, &c.?
What do men *mow with?* what *pitch with?*
What do they use when loading and drawing hay?
Why do they *stack* hay?
What do we call men who work in the hay-field?
When is hay made?
Why is hay made?
What do haymakers produce?
How do they obtain clothing? food?

BAKER.

This picture is intended to represent a *bakery*, with some of the operations of making *bread* and *rolls;* also the *shop*, or place for selling the different articles which are made by the *baker*.

The man in the right-hand corner of the picture is *sifting* flour into the *kneading-trough*, to mix *dough* for bread, rolls, &c. A barrel of flour stands by the side of the kneading-trough. The man near the left end of the picture is putting rolls into the *oven* to bake them. He places them on the broad *blade* of a *wooden shovel* which has a long *handle*, and then pushes them into the oven.

In the upper *tray*, on the barrel near the oven, are more rolls ready for baking. Behind the baker at the oven is a *table* on which are several *loaves of bread*, some of which are in the *baking-pans*. Under this table are *cans*, *jugs*, *tubs*, *baking-plates*, *tins*, &c. Over the table, on the wall, are *rolling-pins*, *knives*, *spoons*, a *measure*, and a *sieve*. Near the right-hand corner, on the wall, is a *wooden spoon*, also an *egg-beater* and a *grater*. Suspended from the ceiling are *oven-shovels*.

What have these bakers on their heads?

At the rear of this picture, near the left hand, is the *shop*, or place for selling bread, rolls, cake, crackers, pie, &c., after they have been baked.

Utensils used by bakers: barrels, kneading-trough, kneading-machine, kneading-board, sieve, tray, measures, scales, tables, counter, cans, jugs, pails, pans, cups, plates, baking-dishes, knives, spoons, egg-beater, grater, rolling-pins, shovels, baskets, oven.

Materials used: wheat flour, Graham flour, rye flour, Indian meal, rice, corn-starch, sago, tapioca, yeast, water, milk, cream, butter, lard, eggs, suet, salt, cloves, spice, cinnamon, nutmeg, ginger, sugar, lemon, soda, saleratus, cream-of-tartar, apples, plums, cranberries, &c.

Articles made: wheat bread, rye bread, Graham bread, brown bread, Indian bread, bread rolls, milk rolls, tea-biscuit, sponge-cake, fruit-cake, pound-cake, jelly-cake, cream-cake, crullers, crackers.

Pies are made of apples, peaches, plums, cherries, blackberries, raspberries, huckleberries, gooseberries, cranberries, lemons, custard, rice, crackers.

Names of puddings: rice, sago, tapioca, corn-starch, suet, Indian, farina, plum, bread, &c.

Kinds of work done: sifting, mixing, kneading, setting the sponge, moulding, baking, rolling, cutting, beating, grating, icing, selling, &c.

From what is bread made?
How is flour made?

Who produced the wheat?
How does the baker obtain the flour?
What do bakers bake?
How do they bake?
Why do they bake?
What is cake? what is pie?
When is bread called twist?
When is it called a loaf?
When is it called rolls?
When is it called biscuit?
Where do bakers live?
Who does the baker's work in the country?
What do bakers produce?
How do they obtain meat and clothing?

TINSMITH.

This picture is intended to represent the *workshop* of a *tinsmith*, and the room or *store* where *tin-ware*, *stoves*, &c., are sold.

The business of the tinsmith is to make utensils, and various articles of tin, sheet-iron, copper, &c. One of the workmen in this picture is making a tin pipe; the other is making a sheet-iron pan.

Materials used by the tinsmith: tin, sheet-iron, wire, solder, rosin, charcoal, copper, brass.

Tools used: shears, pincers, pliers, nippers, vise, hammers, soldering-furnace, soldering-iron.

Articles made by tinsmiths: tin-pails, tin-pans, tin-cups, tin-dippers, tin-measures, boilers, kettles, tea-kettles, tea-pots, coffee-pots, dish-pans, slop-pails, cans, canisters, sauce-pans, dripping-pans, baking-pans, coal-scuttle, parts of stoves, &c.

Tin is a metal obtained from tin-ore. This metal

resembles silver in color; it is softer than silver, but harder than lead.

Common *tin-ware* is made from thin sheets of iron which have been covered with tin metal by dipping the sheets of iron into melted tin three or four times. While the tin metal remains on the iron, the tin-ware will not rust.

See pp. 26, 27.

How do tinsmiths procure food, clothing, houses, &c.?

PRINTER.

This picture represents different kinds of apparatus, tools, and operations of printing.

See pp. 17–21 for a description of this picture.

Materials, Implements, and Tools used by the Printer. — *Type* (letters, figures, &c.), made of *type-metal*, which is composed of lead and antimony.

Type-cases: shallow drawers with numerous small compartments or boxes, for holding the different letters.

Composing-stick: a narrow, oblong frame, with one side open, and one end movable, which may be fastened with a screw so as to suit the width of any column of printing. It is made of metal, usually of iron or steel. The compositor holds this instrument in his left hand, and sets type in it to form words and lines.

Galley: an oblong, shallow tray, usually with a brass bottom and wooden sides, on which the compositor places the type when his "stick" is full.

Imposing-stone: a smooth stone slab, on which the type is placed from the galley, to be *made up* into *forms* ready for printing.

Chase: an iron frame, which is placed around the type

on the imposing-stone, and into which the type or *matter* is firmly wedged with *furniture* (narrow strips of wood), and *quoins*, or wedges.

Shooting-stick: the piece of wood or iron used in driving the *quoins*, or wedges, when *locking up* the *form*. One end is placed against the wedge, and the other is struck with the mallet.

Leads: thin strips of type-metal to place between the lines of type so that the printing may be more easily read than if the matter were *solid*.

The essential parts of a common hand-press are named as follows: —

Bed: the part of the printing-press on which the type rests.

Platen: the part of the printing-press which presses the paper against the type.

Tympan: part of the printing-press; a wooden frame, covered with two folds of cloth between which is stretched a woollen blanket. The tympan carries the sheet of paper to be printed, and forms a soft surface over the paper to equalize the pressure upon the type.

Frisket: a slender frame to hold the sheet of paper in its proper place on the tympan while it is moved to be printed. The frame of the *frisket* extends around the form of type, and does not cover any portion of the printing surface.

Kinds of Work done. — *Composing*, or setting type; *distributing*, or placing the letters in their proper boxes, after they have been used; *justification*, — making the spaces between the words of a line uniform; *making up*, — placing the matter which has been set up by the com-

positor, on the imposing-stone, and making it fast in a chase; *locking up*, — wedging the type firmly in the chase; *taking proof*, inking the type, and pressing upon it a sheet of damp paper; *reading proof*, — having the copy or manuscript, which the compositor set his type by, read so as to compare the words in the proof-sheet with the manuscript to be printed; *correcting proof*, — unlocking the matter, and changing all the words which were not correctly set up. This work is done by the compositor. *Revising the form*, — comparing the type in the form with the proof after the compositor has corrected his errors in setting, to see that all the corrections have been made. This is done by the *foreman*, the man who supervises the other workmen.

Terms used by Printers. — *Solid matter:* type set up without leads between the lines. *Leaded matter:* type that has leads placed between the lines. *Live matter:* type that has been set, but not yet used for printing that for which it was set. *Dead matter:* type that has been used in printing, and is ready to be distributed in the cases again. *Ems:* this is a term used by printers in calculating the amount of matter set up. Compositors are paid for setting type at a fixed sum for each thousand *ems*. As the letter *m* was originally a square type, it was used as a unit in measuring and computing the amount of matter set up. At the present day the letter *m* has lost its square shape; and the square of the height of any letter in the alphabet is now used as a unit, all the types of any given size being of the same height; but the term *ems* has been retained. *Proof-sheet*, —

the impression taken from the type after it is locked up.

What is writing?
What is printing?
Why do people write?
Why do they print?
When is writing used instead of printing?
Why is printing used instead of writing?

NAMES OF SIZES AND KINDS OF TYPE.

This is Great Primer type.
This line is English type.
This line is Pica type.
This line is Small Pica type.
This line is Long Primer type.
This line is Bourgeois type.
This line is Brevier type.
This line is Minion type.
This line is Nonpareil type.
This line is Agate type.
This line is Pearl type.
This line is Diamond type.
This line is Brilliant type.
This is Old English type.

What trades furnish materials or work for building houses?

What trades supply the tools for building houses, and for other occupations?

What trades and occupations furnish materials or work for supplying us with food?

What trades and occupations furnish materials or work for supplying us with clothing?

Why do men work?

Why do they strive to become skilful in their work?

Why do they save their earnings?

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